

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Durairaj, *et al.*

Group Art Unit: 1711

U.S. Patent No.: 7,196,156

Examiner: D. Truong

Issued: March 27, 2007

Attorney Docket No.: 48251-00009USPT
(Cam No.: 049107-999068)

For: FLEXIBILIZED
RESORCINOLIC NOVOLAK
RESINS AND METHOD OF
MAKING SAME

REQUEST FOR CERTIFICATE OF CORRECTION UNDER 37 C.F.R. § 1.323

Assistant Commissioner for Patents
Washington, D.C. 20231

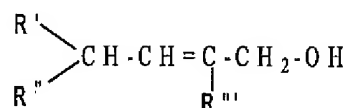
Attn: CERTIFICATE OF CORRECTIONS BRANCH

Sir:

Patentees hereby respectfully request the issuance of a Certificate of Correction in connection with the above-identified patent. Claims 7, 8, 10, and 11, which should have been rejoined into the allowed claims 1-6, 9 and 26-46 (*see* the Examiner's Response to Rule 312 Communication mailed on December 12, 2006), are not incorporated into the issued U.S. Patent No. 7,196,156. This is a mistake made by the USPTO. The correct list of claims is listed as follows, with the rejoined claims 7, 8, 10 and 11 incorporated as claims 29, 30, 31, and 32 respectively.

1. A method of making a flexibilized resorcinolic resin solution, comprising:

(a) contacting one or more phenolic compounds with approximately 0.05 to 0.4 mole, per mole of the phenolic compound of an unsaturated dihydroxy compound having the formula:

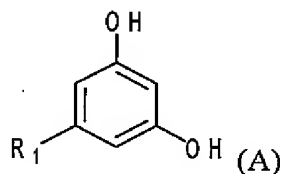


where R', R'', and R''' are individually a hydrogen or an aliphatic straight or branched alkyl, provided that R' and R'' cannot both be hydrogen at the same time, and that one of R' and R'' is or includes an OH group in the presence of an acid catalyst to obtain a reaction mixture; and

(b) contacting the reaction mixture with about 0.1 to about 0.6 mole of an aldehyde per mole of phenolic compound.

2. The method of claim 1, wherein the phenolic compound is selected from m-cresol, 3,5-dimethyl phenol, resorcinol, 5-methyl resorcinol, 5-ethyl resorcinol, 5-propyl resorcinol, m-amino phenol, 2-methyl resorcinol, 4-methyl resorcinol, 4-ethyl resorcinol, 4-propyl resorcinol, phloroglucinol, or a mixture thereof.

3. The method of claim 1, wherein the phenolic compound is represented by the following formula (A):



wherein R₁ represents a radical selected from the group consisting of hydrogen, hydroxyl and an alkyl radical having 1 to 3 carbon atoms.

4. The method of claim 1, wherein the acid catalyst is selected from oxalic acid, sulfuric acid, benzenesulfonic acid, benzenedisulfonic acid, p-toluenesulfonic acid, phosphoric acid, or a mixture thereof.

5. The method of claim 1, wherein the reaction mixture comprises at least one compound having an alkylene ether linkage.

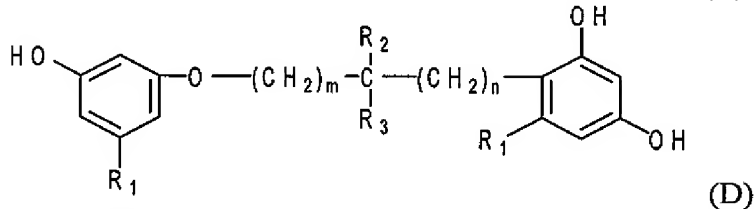
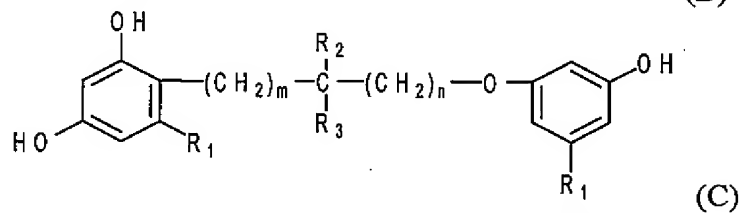
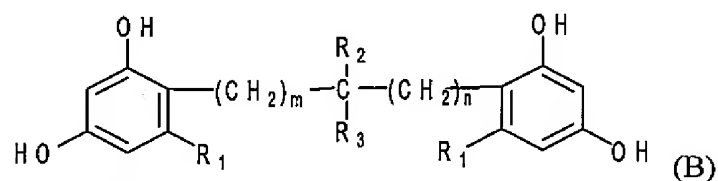
6. The method of claim 1, wherein the contacting is carried out at a temperature in the range of between about 120° C and about 150° C.

7. The method of claim 1, wherein the aldehyde is selected from the group consisting of formaldehyde, acetaldehyde, propionaldehyde, n-butyraldehyde, n-valeraldehyde, and mixtures thereof.

8. An adhesive composition, comprising a flexibilized resorcinol resin prepared by the method of claim 1.
9. The adhesive composition of claim 8, wherein the adhesive composition is a single-step adhesive composition comprising an aqueous mixture of (a) the flexibilized resorcinol resin (b) a basic solution; (c) an aqueous formaldehyde solution; (d) a vinyl pyridine SBR copolymer latex; (e) water and (f) optionally one or more adhesion promoter additive compounds selected from blocked polyisocyanates, water soluble or dispersible aliphatic or aromatic epoxy compounds and organosilanes.
10. The adhesive composition of claim 9, further comprising an adhesive selected from polyepoxide compound and blocked polyisocyanates.
11. The adhesive composition of claim 10, wherein the blocked polyisocyanate compound is selected from addition reaction products of a polyisocyanate compound with a blocking agent comprising at least one member selected from caprolactam, phenolic compounds or oxime compounds.
12. A novolak resin prepared by the method of claim 1.
13. A method of making a flexibilized resorcinolic resin solution, comprising:
 - (a) contacting one or more phenolic compounds with approximately 0.05 to 0.4 mole of an aliphatic dialdehyde compound per mole of the phenolic compound, in the presence of an acid catalyst to obtain a reaction mixture; and
 - (b) contacting the reaction mixture with about 0.1 to about 0.6 mole of an aldehyde per mole of phenolic compound, the aldehyde being different from the aliphatic dialdehyde to make a novolak type resin.
14. The method of claim 13, wherein the dialdehyde compound is selected from malonaldehyde, succinaldehyde, glutaraldehyde, adipaldehyde and a mixture thereof.
15. The method of claim 13, wherein the molar ratio of the phenolic compound to the dialdehyde compound is between about 1:0.05 and about 1:0.3.
16. An adhesive composition, comprising a flexibilized resorcinol resin prepared by the method of claim 13.

17. The adhesive composition of claim 16, wherein the adhesive composition is a single-step adhesive composition comprising an aqueous mixture of (a) the flexibilized resorcinol resin (b) a basic solution; (c) an aqueous formaldehyde solution; (d) a vinyl pyridine SBR copolymer latex; (e) water and (f) optionally one or more adhesion promoter additive compounds selected from the group consisting of blocked polyisocyanates, water soluble or dispersible aliphatic or aromatic epoxy compounds and organosilanes.
18. The adhesive composition of claim 17, further comprising an adhesive selected from the group consisting of polyepoxide compound and blocked polyisocyanates.
19. The adhesive composition of claim 18, wherein the blocked polyisocyanate compound is selected from addition reaction products of a polyisocyanate compound with a blocking agent comprising at least one member selected from caprolactam, phenolic compounds or oxime compounds.
20. A novolak resin prepared by the method of claim 13.
21. A vulcanizable rubber composition comprising a flexibilized resorcinol resin prepared by the method of claim 1.
22. A vulcanizable rubber composition of claim 21, wherein the rubber is a natural rubber, polybutadiene rubber or rubbery butadiene-styrene copolymer.
23. A vulcanizable rubber composition of claim 21, wherein the rubber is a nitrile rubber, chloroprene rubber, polyisoprene, acrylic rubber, ethylene-propylene-diene monomer (EPDM) rubber or isoprene-acrylonitrile rubber.
24. A tire comprising the vulcanizable rubber composition of claim 21.
25. A vulcanizable rubber composition comprising a flexibilized resorcinol resin prepared by the method of claim 13.
26. A vulcanizable rubber composition of claim 25, wherein the rubber is a natural rubber, polybutadiene rubber or rubbery butadiene-styrene copolymer.
27. A vulcanizable rubber composition of claim 25, wherein the rubber is a nitrile rubber, chloroprene rubber, polyisoprene, acrylic rubber, ethylene-propylene-diene monomer (EPDM) rubber or isoprene-acrylonitrile rubber.

28. A tire comprising the vulcanizable rubber composition of claim 25.
29. The method of claim 1, wherein the unsaturated dihydroxy compound is 1,4-dihydroxy-2-butene.
30. The method of claim 1, wherein the reaction mixture comprises one or more compounds as represented by the following structures (B, C and D).



where R_1 and R_2 are independently $-\text{CH}_3$, $-\text{CH}_2\text{CH}_3$, or $-\text{CH}_2\text{CH}_2\text{CH}_3$; and R_3


is either $-\text{H}$ or and $m=0, 1$ or 2 and $n=0, 1$ or 2 .

31. The method of claim 1, wherein the molar ratio of the phenolic compound to the unsaturated dihydroxy is between about 1:0.1 to about 1:0.3.
32. The method of claim 1, wherein the molar ratio of the phenolic compound to the aldehyde is between about 1:0.35 to about 1:0.45.

Applicants hereby certify that the above-mentioned errors are made by the USPTO. Accordingly, no fee should be required and Applicants respectfully request that a Certificate of Correction be issued in due course. Nevertheless, the Commissioner is authorized to charge any required fee or credit any overpayments to Jones Day Deposit Account No. 50-1432.

Respectfully submitted,

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